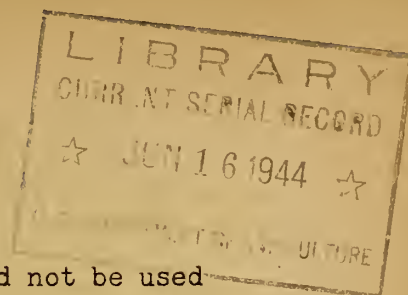


Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

1.96
R 81 Sum
Reserve

Summary Review of Monthly Reports
for
SOIL CONSERVATION SERVICE RESEARCH
Period: March 1 to April 1, 1944



This report is for in-Service use only and should not be used for publication without permission from the Washington Office, Soil Conservation Service Research

EROSION CONTROL PRACTICES DIVISION

Conservation Experiment Stations Section

Richard M. Smith of Morgantown, West Virginia reports: "Considerable evidence has been noted in the field which suggests that closer attention to weed species as well as to species of grasses and legumes would lead to an improvement in field recommendations for pasture treatment and improved accuracy in the prediction of results of treatment or clipping."

Oren R. Neal of New Brunswick, New Jersey reports: "Work has been in progress to determine the relationship between variations in weight of "gravimetric plugs," as developed by C. S. Slater, and variations in the moisture content of Collington sandy loam. Containers were filled with a quantity of soil of known dry weight and a plug installed in each container. Variations in soil moisture content were determined by daily weighing of the entire unit.

"The gravimetric plugs maintained a maximum weight through a range of soil moisture content varying from 25 per cent down to about 10 per cent. From 10 per cent down to about 4.5 per cent, the plug weights varied directly with the changes in soil moisture content. The range covered by the equipment on this sandy soil would evidently be increased if the plugs were made of a material having larger pore sizes. Possibly different plugs could be made up having pore spaces suitable for use in sandy, silt, and clay soils. The present plugs may be useful in sandy soils for specific purposes such as determining the need for irrigation. In such cases it is not imperative that the actual soil moisture content be determined so long as it is known to be above some specified value. The gravimetric plugs would serve this purpose well."

R. E. Dickson of Spur, Texas reports: "Germination studies of buffalo grass seed show that delayed germination is an important factor in establishing grass by seeding. Out of a total of 9,600 seeds planted in 1940, 10.98 per cent of the seed germinated by October 27, 1940, 25.24 per cent by November 10, 1941 and 26.94 per cent by December 1, 1942. No emergence occurred in 1943. Plantings made at a depth of 1/2 inch gave higher germination than those made at a depth of one inch, or more. The influence of shading and litter treatments did not appear to greatly increase germination."

O. E. Hays of LaCrosse, Wisconsin reports: "Since 1939, severely eroded and moderately eroded control plots have been in a five-year rotation of corn, grain, and three years of hay. Lime is applied on corn at rates necessary to maintain a pH of 6.5. Eight tons per acre of barnyard manure is also applied on corn. Phosphorous and potassium fertilizers are applied on grain to maintain a level of 50 pounds of phosphorous and 150 pounds of K_2O per acre. Samples of crops produced in 1943 were analyzed by Dr. H. H. Hull of the University of Wisconsin to determine the effect of degree of erosion on nutrient content of crops produced on severely eroded soil with less than 3 inches of surface soil, and moderately eroded soil with 5-6 inches of surface soil. Data obtained are contained in the following table:

Degree of erosion	Yield per acre	Nutrient content of crop in pounds per acre			
		N	P	Ca	Mg
		<u>Hay</u>			
Severely.....	3.76 T	174.46	19.92	87.23	25.33
Severely.....	2.98 T	125.16	15.28	61.39	16.78
Moderately.....	3.87 T	180.3	20.56	88.24	24.70
Moderately.....	3.29 T	144.10	18.92	68.43	24.21
		<u>Grain</u>			
Severely.....	10.2 Bu.	10.67	1.51	.26	.39
Moderately.....	22.6 Bu.	23.76	3.49	.72	1.21
		<u>Corn</u>			
Severely.....	60.2 Bu.	43.82	--	.42	4.56
Moderately.....	77.5 Bu.	70.31	--	.56	6.08

Alvin E. Lowe of Garden City, Kansas reports: "Most of the wheat that did not emerge last fall has not yet emerged. The plants that are through the ground are weak and the stands very poor. In addition Russian thistle plants are also emerging to heavier stands than the wheat. It now appears that most of the wheat seeded in this territory last fall will be abandoned or will be taken by weeds as most of the wheat seeded last fall did not emerge. That which did emerge has considerable promise. The value of fallow is clearly demonstrated as nearly all the wheat seeded on well packed fallow emerged last fall. Wheat on stubble ground one-wayed in July also emerged to good stands. All other continuous crop methods of seedbed preparation and loose fallow have spotted stands or poor stands trying to emerge now which will surely be a failure. The trashy fallow plot on the Basin Project has a very spotted stand that will undoubtedly become very weedy. Most of the other plots appear to have good enough stands to keep down the weeds."

H. O. Hill of Temple, Texas reports: "From a test under greenhouse conditions Dr. Johnston has found that tomatoes respond favorably to organic matter and phosphate fertilizer applications on Blackland soils. The data from this test are shown in Table 1.

"Table 1.-Dry matter produced and available soil phosphorus following organic matter and phosphate applications

Treatment and rate of application, per acre	Dry matter yield *	Available phosphorus**
	Grams	p.p.m.
Check.....	1.1	6.0
400 pounds superphosphate.....	9.3	11.2
4T barnyard manure***.....	10.2	12.5
4T barnyard manure and 400 lbs. superphosphate	8.8	20.0
4T alfalfa green manure.....	9.9	8.9
4T alfalfa and 400 lbs. superphosphate.....	15.8	12.7
4T oats green manure.....	10.8	9.9
4T oats and 400 lbs. superphosphate.....	13.2	12.8
4T oats-alfalfa green manure.....	10.2	10.1
4T oats-alfalfa and 400 lbs. superphosphate...	13.4	15.4

* A difference greater than 2.94 grams is significant.

** A difference greater than 3.25 p.p.m. is significant.

*** Dry matter content of manures based on oven-dry weight."

Hugh C. McKay of Aberdeen, Idaho reports: "In 1943 a small preliminary experiment on the use of sweet clover and grass residue as a stubble mulch was carried on. The moldboard and modified moldboard plows were used in the initial tillage. No difficulty was encountered in killing the sweet clover and grass. Mountain brome grass was used in the mixture and it made up almost 50 per cent of the residue by dry weight. No differences in moisture were found at seeding time between the two types of tillage, but there was considerable difference in moisture between the different dates of plowing as shown by the following table:

"Per cent moisture in 6 feet of soil and nitrate nitrogen in 2 feet of soil in the fall at seeding time for land in sweet clover and grass subsurface tilled and plowed for green manure on three dates in 1943, Tetonia, Idaho

Types of tillage	Dates of tillage		
	June 10	June 21	July 1
Moldboard plow			
Per cent moisture (6 feet).....	12.7	10.8	7.7
Nitrate nitrogen (total ppm 2 feet):	35.4	33.6	10.9
Subsurface tillage*			
Per cent moisture (6 feet).....	12.6	11.1	7.5
Nitrate nitrogen (total ppm 2 feet):	24.3	26.5	17.3
Crop weight, tons per acre, dry weight.	1.55	2.05	2.45

* Moldboard plow with moldboard removed and 2-inch strap iron attached above plowshare.

"The earliest plowing leaves sufficient moisture in the fallow to produce a wheat crop, but the last date of plowing shows the available moisture is nearly exhausted and burning of the following wheat crop is to be expected. The late plowing is the normal time for farmers to plow down sweet clover in this area."

C. J. Whitfield of Amarillo, Texas reports: "Soil moisture samples taken on the stubble mulch plots on March 25 and 26 show a relatively good supply of stored moisture to a depth of 5 feet on fallow and to 4 feet on continuous wheat. There was approximately 1 inch more water in the 5-ft. profile of land tilled with the large sweeps and the Noble blade as compared to moldboard plowing, oneway disk plowing and listing. Inches of water stored in the 5-ft. profile of these treatments is as follows: Large sweeps, 16.49; Noble blade, 16.88; Moldboard plow, 15.30; oneway disk plow, 15.71; and listing, 14.52. Delayed fallow, which held snow in the standing residue, was wettest with 18.96 inches of stored water.

"On the rate-of-residue plots there was a direct relationship between the weight of residue and the amount of water in the profile. The greatest amount of water was stored where the residue was heaviest. There was also more water in the profile where the residue was retained nearest the surface. There greatest amount of water was present where the large sweeps were used. The oneway disk ranked second in stored water and the moldboard plow stored the least.

"There has been a widespread interest in the use of crested wheatgrass during the past 2 or 3 years in this part of the Plains. The need of a grass that will "fill in" between wheat pasture and native pasture is a vital problem in this area and crested wheatgrass shows promise of

furnishing green forage during this period. It has been the general opinion that crested wheat would not survive a dry hot summer such as 1943. A large number of fields seeded to crested wheat since 1938 in eastern New Mexico and the Panhandle of Texas was visited during the month. All plantings survived the 1943 summer and are vigorous, following favorable winter moisture. Also, most plantings are furnishing abundant grazing at this time and many farmers who have plantings are seeding additional acreage.

"Several fields of weeping lovegrass were inspected in eastern New Mexico during the month. Farmers are well pleased with the grazing value and high forage production of this grass. There has been a small amount of winter killing on some fields in past seasons, although natural reseeding has maintained good stands. Results of chemical analysis, taken in cooperation with the Texas Agricultural Experiment Station, of weeping lovegrass samples collected on the Station during the season of 1943 have been summarized. The comparative analysis for protein, calcium, and phosphorus of lovegrass, blue grama, and buffalo grass is shown in the following table:

"Chemical analyses of pasture grasses - Samples collected at different dates

Date sampled	Weeping lovegrass (per cent)			Blue grama (per cent)			Buffalo grass (per cent)		
	Protein	CaO	P ₂ O ₅	Protein	CaO	P ₂ O ₅	Protein	CaO	P ₂ O ₅
<u>Apr. 27, '43</u>									
Residual growth....	4.31	.35	.13	4.83	.36	.20	4.74	.39	.20
Seasonal growth....	14.85	.71	.46	13.71	.40	.66	13.40	.45	.66
<u>Aug. 23, '43</u>									
Seasonal growth....	8.82	.57	.32	6.29	.49	.40	5.90	.50	.36
<u>Oct. 8, '43</u>									
Seasonal growth....	5.64	.50	.24	5.05	.34	.29	5.15	.42	.28
Average seasonal growth....	9.77	.56	.34	8.35	.41	.45	8.15	.46	.43

"It is noted that weeping lovegrass was slightly higher in protein and calcium than blue grama and buffalo grass but was lower in phosphorus. This trend was about the same for all sampling dates."

T. C. Peele of Clemson, South Carolina reports: "Measurements of percolation rates through cores of soils having their field structure are being conducted in cooperation with the Conservation Surveys Division. Six cores, 6 inches in diameter and 6 inches in length, are collected at each location. Originally only four were taken, but it was decided that six would be needed for securing a representative value. Physical analyses being made on samples collected from these locations include: suspension percentage, dispersion ration, mechanical analysis, pH, moisture equivalent, water of imbibition, and organic carbon. Complete data have been secured on seven A horizons and ten B horizons, and percolation measurements have been made on several other soils. All of the B horizons had pH of less than 5.2 except one. The data will be summarized later when more soils have been tested.

"One of the key operations in our mulch farming method, where winter cover crops are used as a source of mulch for corn, is the preparation of beds in the cover crops, leaving an undisturbed balk to be mulch-plowed later. This year we had planned to prepare the beds between the first and fifteenth of February, but the soil was too wet to cultivate any time between the first of February and the fifth of April with the result that the vetch and rye growth was so large that it could not be handled in this manner and it was necessary to cut it thoroughly with a disk before beds could be prepared. In the future the beds will be prepared as soon as possible after the first of December.

"One reason that cover crops have not been more widely used in this Section is that during wet years the growth gets too heavy for the farmer to handle with the equipment that he has available and delays the planting of cotton and corn. If the mulch farming method which we are using is adopted as a general farming practice and the beds are prepared in the fall or early winter, this objection will be eliminated. In our opinion beds prepared on the contour in the fall or early winter would also give much greater protection against erosion than winter cover crops as most of the winter crops do not afford much protection until about the middle of February."

G. M. Browning of Ames, Iowa reports: "There was a meeting on March 29 of the Southwest Iowa District Commissioners to discuss the needs for research work in Southwestern Iowa and the possible steps that might be taken in getting work of that type underway. Representatives from six Southwest Iowa Districts were present as well as two representatives of Henry Field Seed Company who are interested in supporting certain research studies in Southwest Iowa.

"There also was a meeting in Monona County on March 31 to discuss possibilities for experimental work and an outlying experimental field to study problems of Western Iowa. Representatives of the Extension Service from Ames and in the county, representatives of the Soil Conservation Service, District Commissioners from Harrison, Monona, and Woodbury Counties, and town representatives from these counties were present at the meeting.

This is a follow-up of requests for work of this type which have been made at different locations during the last two or three years. They are extremely anxious to carry through all work of this type and are willing to sponsor the work. A committee was appointed to consider the possibilities of obtaining land in that section for experimental purposes."

G. A. Van Doren, of Urbana, Illinois reports: "A contour farming model was exhibited at Farm and Home Week, February 8, 9, and 10 at the University of Illinois. Rainfall was applied to corn growing in rows planted up and down the slope and in rows planted on the contour. Rain was applied at the rate of 1.30 inches per hour. Rainfall was applied for three periods of thirty minutes each during each of the three days. Approximately 160 Farm and Home Week visitors saw the model while it was in operation. It is estimated that approximately 400 other persons visited the exhibit while rainfall was not being applied. Many favorable comments were overheard while visitors were examining the exhibit. Many persons were surprised at the great reduction in runoff resulting from the practice of contour farming. The Urbana Courier photographed the exhibit and printed a news release in the February 20 edition.

"Dixon Springs, Illinois.-Charts have been prepared for each of the two years, 1942-1943, showing precipitation by individual storms and total runoff caused by these storms on Plot 1, treated, severely-grazed, as contrasted with runoff from Plot 2, treated, moderately-grazed. In 1942, moderate grazing resulted in a reduction of 7.24 inches in runoff. In 1943 the reduction was 3.08 inches. In 1942 approximately 60 per cent of the seasonal reduction in runoff as a result of grazing management occurred during the six months period, April through September. In 1943, 95 per cent of the seasonal reduction in runoff occurred during the 6 months growing season from April through September. These data reveal that conservation of moisture through careful grazing management will certainly profit the farmer through increased quantities of forage produced in seasons of the year when soil moisture may be limiting production."

R. A. Norton of Ames, Iowa reports: "In the field of soil and water relationships plans for the coming season fall into three categories. In North Central Iowa, field tests to evaluate the effectiveness of tile drainage on existing systems will be in progress on several fields. Corn heights, yields and, at some locations, water table elevations will be used as criteria of effectiveness of drainage. Preliminary studies of suitability of the clay pan soils of southern Iowa and the heavy till soils of northeastern Iowa for mole drainage or a combination of mole and tile drainage are planned. Other studies for later investigation include water table elevation on the peat soils at the Crystal Lake Experimental Farm in Hancock County, Iowa; crop yield distribution on tiled fields in the planosol region of southern Iowa and field permeability of several areas in Iowa."

J. C. Hide of Manhattan, Kansas reports: "Mr. Fowler spent much of February and the early part of March working up his data for presentation on a thesis. Many interesting relationships between the various data were found.

"Careful examination of the moisture data seems to indicate that the subsurface-tilled plots both take up and lose water more readily than do plowed plots. The influence of subsurface tillage on infiltration is well recognized, but this seems to be at least partially offset by an increased loss of water through evaporation during dry weather. This may be associated with a slow drying of the surface on trash-covered plots which allows greater movement of water to the surface by capillarity.

"There was a significant correlation between the degree of aggregation in the samples as taken directly from the field without intermediate drying and the moisture content at the time the samples were taken. While air drying was found to decrease the amount of material that is aggregated, data are not available to indicate if this effect is similar on differently aggregated samples. In cultivated soils the amount of aggregated material varied highly throughout the year and was about three times as variable as was the amount of aggregated material under sod.

"On several occasions during the fall and early winter the degree of aggregation was found to change radically within 1 to 2 hours after the samples were brought to the laboratory. The samples had been passed through a coarse screen but had not dried appreciably. The most apparent explanation of this phenomenon appeared to be that, following screening, the carbon dioxide was lost from the soil solution with a consequent effect on soil acidity. A preliminary investigation is in progress to determine if the carbon dioxide content of the soil air appreciably affects the degree of aggregation.

"The decrease in carbon which follows bringing a soil under cultivation appears to have taken place mostly in the aggregated fraction of the soil. Thus both the degree of aggregation and the percentage of carbon in the aggregates is reduced following cultivation. There is an indication that incorporation of organic matter in the soil builds up a temporary form of aggregate which persists only during the period of active decomposition.

"It was surprising to find that total bacterial numbers were similar in both the aggregated and unaggregated fraction when the carbon and nitrogen content of the aggregated fraction is decidedly higher than is that of the unaggregated fraction. Under sod there was some relationship between the numbers of fungi and the degree of aggregation.

"Since Dr. Myers of this institution observed that treating a soil with toluene increased the swelling on the addition of water, it was decided to see if base exchange capacity was similarly influenced. No difference in base exchange capacity was found following the treatment of soil with toluene. No further work along this line will be undertaken."

Conservation Economics Section

Elmer L. Sauer of Urbana, Illinois reports: "Contour farming holds most of the water that falls during the growing season, and thus gives the growing plant a 'boost' when it needs it, as well as helps to prevent harmful erosion. Farm account records show that contour farming does not add to the cost of operating land.

"Average per acre yields of crops grown on the contour and not on the contour on the same Southern Illinois farms, four-year average, 1940-43.

Item	Corn	Soybeans	Oats	Wheat
Number of farms.....	59	5	9	37
Yield on contour, bushels.....	51.1	26.3	31.5	25.0
Yield not on contour, bushels.....	46.5	23.4	27.7	20.2
Number of farms on which crop on the contour yielded higher.....	46	5	7	31
Difference in yield in favor of contouring.....	4.6	2.9	3.8	4.8

Hillculture Section

Henry Hopp of Beltsville, Maryland reports: "Laboratory studies were made this past winter at the Hillculture Laboratory, Beltsville, Maryland, on methods of increasing the effectiveness of weed-killing foliage sprays by means of supplementary solvents added to the herbicide solution. This study was correlated with investigations in Texas on developing soil-conservation methods of brush eradication on range lands. Application of dilute solution of sprays to pot-grown Coleus and Cuphea test plants under controlled conditions gave the following results:

1. Absorption of aqueous sprays was poor in low atmospheric humidity due to rapid drying of solution on the outside of leaves.
2. Translocation of poisons within the plant from the foliage to the underground parts was greatest when the soil was dry, due to a water tension which appears to draw the spray solution down through the stem.
3. Addition of 2 per cent glycerin to dilute aqueous sprays of sodium arsenite or ammonium sulfamate increased their effectiveness under dry atmospheric conditions, apparently because the glycerin held the poison in a dissolved state on the surface of the leaves after the water in the spray had evaporated.

4. Good results were obtained when spray solutions containing glycerin as a supplementary solvent were applied to the leaves of plants exposed to low atmospheric and soil moisture conditions. Glycerin had no apparent influence on the effectiveness of the sprays under high moisture conditions.

"The above results were obtained in tests with dilutions of 0.2 molar ammonium sulfamate and .01 molar sodium arsenite. These concentrations of poison with 2 per cent glycerin added were about 1/5 those required to give an equal killing effect when aqueous solutions without glycerin were used."

J. M. Aikman of Floris and Ames, Iowa reports: "Weekly minimum temperature readings were taken during the winter of 1943-44 at three sites on the Hillculture farm at Floris, Iowa: Hilltop, mid-slope and bottom of slope. The elevations of the hilltop and mid-slope sites above the bottom site were 100 ft. and 35 ft. respectively. The coldest day of each wk. was determined by comparison with the thermograph records from the weather stations located on the farm. In the table are listed a few selected readings to show some of the widest variations among the stations compared to Weather Bureau records from the nearest stations when available."

"Comparison of minimum temperature in degrees F during winter storm periods at three elevations on a south slope and at the two nearest Weather Bureau stations, 1943-1944"

Date	Weather Bureau **		Floris Farm *		
	Ottumwa	Bloomfield	Hill top	Mid-slope	Bottom of slope
Dec. 16	-7	-9(Dec.15)	-10	-13	-16
Dec. 23	-3	-3	-5	-9	-10
Jan. 8	-3	-6	-5	-7	-10
Jan. 13	-2	-6	-3	-8	-10
Feb. 12	-	-	-15	-18	-22
Feb. 18	-	-	-6	-9	-17

(** Sheltered thermometers. * Unsheltered thermometers.)

"It appears that the unsheltered thermometers on the Floris farm may account for the slightly lower temperature at the hilltop site as compared with the sheltered stations at Ottumwa and Bloomfield. The temperature depression at the other two farm stations may be great enough to endanger some plants that are adapted to temperature conditions of hilltops."

V. T. Stoutemyer and F. L. O'Rourke of Glenn Dale, Maryland report: "Additional data on the influence of temperature on rooting of cuttings following treatment with synthetic plant growth substances has been obtained and supports the finding reported in the month of January

that temperature is not necessarily a limiting factor in the action of these substances. This contradicts the prevalent idea that these substances are not active in root formation at temperatures much below 65 or 70°F."

Maurice Donnelly of Riverside, California reports: "Flood runoff from the heavy rains of February, which continued into early March, caused considerable damage in the Simi Valley and elsewhere in Ventura County, California. Most of this damage is readily evaluated, but there is one consequence of the flood flows that may be overlooked. Because of the relatively good plant cover on many watersheds, the debris load delivered to some streams was not enough to equal their capacity. Consequently some of these streams scoured their channels to bedrock, exposing knickpoints, or overfalls, in the stream bottom which in future years are apt to migrate headward. Unless this process of headward migration of knickpoints is checked, man-made structures in the path of migration are likely to be weakened or destroyed and the whole area involved will become susceptible to a new cycle of tributary gullies.

"The weed Senecio vulgaris, commonly called groundsel, is rather widespread in the lima bean fields of Ventura County. This weed is a pioneer and hence comes in on soils where other plants have difficulty in establishing themselves without cultivation. Flowers and seeds mature early. This spring, groundsel at Somis had already set seed at a time when black mustard was just in full bloom. Often forming thick uniform stands, groundsel is shallow rooted and is readily killed by shallow, uninverted cultivation, as with a spring-tooth harrow. I doubt if groundsel is much of a pest in grain culture, which is not the case with some of the other volunteer winter cover crops of bean fields that are rather easily killed by shallow cultivation. The seeds are equipped with a dainty parachute, something like that of the dandelion, which enable them to get about easily. Part of the check fields at the Somis Farm have shown a gradual increase in yield, not accounted for by fluctuations in climatic influences. This increase in yields is also matched by a perceptible improvement in structure in these same plots. I now believe that much of this improvement in structure and yield is caused by gradual increase in the amount of groundsel (along with other plants) growing on these plots as volunteer winter cover crop."

WATER CONSERVATION AND DRAINAGE DIVISION

Hydrologic - Land Use Studies

North Appalachian Experimental Watershed at Coshocton, Ohio -

Early in March there was sufficient rainfall to replenish depleted soil water reservoirs. Winter wheat which had a bad start last fall due to lack of soil moisture responded to these late winter rains and prospects are good for at least an average crop.

Precipitation recorded at the recording rain gage Y-102 located near project headquarters amounted to 5.14". A rain 1.30" on March 6, fell at a low rate (0.6 in/hr. for 5 min., 0.4 in/hr. for 30 min. and 0.3 in/hr. for 1 hour) so that all that fell on grass land infiltrated into the soil. Some runoff and sheet erosion was observed on fallow and wheat land. Although very little surface runoff occurred during this storm, the streams draining 200 acres or more were bank full. Much of this runoff resulted from the rapid movement of water from shallow perched water tables formed by the relative large amount of water infiltrated.

Tests were made using the quadrat meter to determine the time required to obtain adequate cover density values. Preliminary results show that 20 settings (200 readings) for a homogeneous meadow area gives estimates of the percentage of ground surface covered by grasses and legumes, by weeds, and by litter which very seldom are in error by more than 10 percent. A trained observer with a helper should be able to complete observations on about 15 meadow watersheds in a day.

H. W. Black along with H. T. Marshall, District Conservationist, conducted two 2-hour classes in conservation at the annual Coshocton High School vocational guidance conference on March 14. Approximately 40 high school students attended the classes.

At a meeting of the CPS Coshocton camp, L. L. Harrold, Project Supervisor, gave a talk stressing the value of watershed data and application of findings. Arthur E. Morgan, consulting engineer of Yellow Springs, Ohio, visited the camp and further impressed the boys with the value and need for watershed data. Mr. Morgan spent part of the day at project headquarters discussing the general aspects of hydrologic and hydraulic data obtainable from the project program.

Central Great Plains Experimental Watershed at Hastings, Nebr. -

During the month the precipitation at the Meteorological Station was 1.48". Most of the precipitation fell as snow. There was very little wind so the snow did not blow off of the fields. The moisture will materially aid the spring crops as there was very little runoff. Much of the wheat ground will be planted to oats and barley as very little of the wheat that was planted survived through the winter.

Hydrologic Studies - LaFayette, Indiana - Rain and snow records during March averaged about 3.20". This is approximately the normal for March. A rain of 1.42" on March 4 produced runoff of 0.16" and 0.12" from two watersheds in wheat under prevailing practice. Similar watersheds in wheat under the conservation treatment produced only very slight traces.

A meeting was held with representatives of the Experiment Station, the Extension Division and SCS Operations on March 23, to consider the present soil and moisture conservation research program in the light of water needs and anticipated changes in agriculture in the State. It was generally agreed that soil conservation action programs were seriously handicapped for research information and to meet these needs, the research program should be both broadened and accelerated.

Hydrologic Studies - East Lansing, Mich. - Rain fell on eight days and snow on eleven days during the month, a total of about 2-1/2". W. U. Garstka, Project Supervisor, attended a number of sessions of the annual meeting of the Soil Conservation Service Michigan Districts personnel which was held at East Lansing on March 14, 15, and 16 under the sponsorship of the State Office Soil Conservation Service.

At the request of Mr. A. D. Ash, Engineer in charge of the U. S. Geological Survey office at Lansing, the Project has been keeping the Geological Survey informed of the presence and persistence of frost layers in the ground. The soil has remained frozen at some depths throughout the month. There has been some thawing out of the surface horizons during periods of air temperatures above 32°. However, the frost penetration has remained at a depth of between 18 and 24" below the soil surface. Soil temperatures in the upper horizons have hovered around 32°. The snow blanket was of evanescent character. Traces of snow disappeared through direct evaporation. Shallow depths either produced low stage runoffs or soaked into the upper horizons of the soil during thaws. Snow depths were too shallow to permit any snow surveys during the month.

The Geological Survey has been especially interested in the time of occurrence and magnitude of runoff at the cultivated watersheds. The watersheds have been observed to be pretty good index areas for forecasting changes in gage heights of flow in the Red Cedar River.

Electric heaters were installed at cultivated watershed "A" and "B". Chromalox strip heaters rated at a 110 volts were found to supply heat of sufficient low temperature to prevent melting out of solder in the type 3-H metal flume when used in a 55 volt circuit. The assembly of the units was greatly simplified through electric spot welding of the strip heaters directly to support rods. The heaters are controlled by a pair of thermostat switches so that they receive current only between pre-set temperatures. No current is supplied to the strip heaters above 32° and also no current is available when air temperatures fall below a predetermined level below which runoff under the prevailing conditions may not take place.

Arnot Soil Conservation Experiment Station, Ithaca, N. Y. - B-2 -
According to local weather records, this has been the coldest March in 18 years. Precipitation, 2.97", was slightly below normal. Snowfall was light, resulting in bare fields and an average of 8" of snow in the wooded areas, as of March 16, their last snow survey. Where the open fields did not have a snow cover, the ground was frozen; in some areas seepage to the surface formed a 2" ice layer. Because of only a light snow cover in the wooded areas, ground was partially frozen. In both cases, conditions were ideal for a heavy runoff, but fortunately heavy rains did not occur. The maximum peak was only 0.78 cfs on both idle land and woodland watersheds.

Microbiological Studies - Lincoln, Nebraska - Samples of nitrates were taken at Hastings watershed project from stubble mulch plots established last year. The surface samples showed about the same nitrate content as last fall, indicating there has been little downward movement of nitrates during the winter due to the light precipitation. The work on determining relative stability of lumps of soil from different types or treatments has been continued. A manuscript describing these results has been prepared.

Hydrologic Studies - Cherokee, Oklahoma - Precipitation for the month was about normal at both stations. There were three storms, one of which amounted to .93". The intensity of this particular storm was sufficient to cause runoff from most of the plots tilled up and down the slope.

Runoff Studies

Region III - Hamilton, Ohio; Edwardsville, Ill.; and Fennimore, Wisconsin - There has been considerable runoff on all watersheds at Fennimore due to the rain on frozen ground and also melting snow. It is difficult to obtain accurate records because in many cases the float freezes in the well between runoff periods. A small amount of runoff was recorded at Edwardsville. W. E. Minshall, Project Supervisor for the Edwardsville and Fennimore studies, spent most of the time during the month on continuation of work on the preliminary report for the Clay Pan Prairies. Mr. M. H. Culp of the Regional Engineering Division visited Madison March 3 to discuss infiltration rates which have been obtained from the runoff studies.

Region IV - Guthrie and Muskogee, Okla.; Bentonville, Ark.; and Garland, Texas - The total runoff for watersheds on the Guthrie station for years 1940 to 1943, inclusive, is given in the following table:

Watershed	Area Condition	Acres	Slope	Inches Runoff			
				1940	1941	1942	1943
1-C	Terraced	10.48	5.60	5.07	11.02	5.56	4.86
2-C	Cultivated	5.62	4.42	5.30	13.40	6.34	5.27
W-I	Virgin	2.50	5.65	0	.18	2.13	.69
W-II	Grass	5.09	5.15	0	.26	.54	.23
W-III	Eroded	9.09	7.06			4.40	3.50
W-IV	Grass	13.37	4.72			4.51	3.48
W-V	Eroded	15.69	4.61			3.44	3.26
W-VI	Grass	94.80	6.01			2.10	1.32

There were 19 days during this period on which rain fell on one or more of the watershed at Bentonville and there were eight storms causing runoff. The maximum runoff rates in cfs per acre were: 0.38" and 0.32" on the cultivated (10 and 18 acres); 0.19" on the terraced (10.8 acres); 0.11" on the wooded (24 acres); and 0.0" and 0.02" on the grassed watersheds (14.2 and 9.3 acres). At Muskogee there were 13 days in February and 10 days in March during which rain fell on one or more of the watersheds. The maximum rates of runoff in cfs per acre were: 0.72" for strip cropped (14.5 acres); 0.72" on terraced (65 acres); 1.6" on cultivated (22 acres); and 0.97" on grassed watersheds (25 acres). The mean rainfall for the Garland watersheds was 4.01" for the month of February. This occurred on 13 days during the month. The storm of February 27 produced runoff on three cultivated watersheds, (16.2, 14.5, and 13.6 acres), with the following rates: 0.06"; 1.76"; and 0.19" cfs per acre, respectively.

V. D. Young, Project Supervisor for the Bentonville, Muskogee and Garland studies, returned to the office from sick leave on March 25. The tabulation of 1943 runoff for some of the watersheds for Bentonville was started. Compilation of 1943 rainfall records for some of the Muskogee stations have been completed and others started.

Region VI - Colorado Springs, Colo.; Albuquerque and Santa Fe, N. M., and Safford, Arizona - Precipitation during March at Colorado Springs was all snow with an average water equivalent of 1.04". There was no runoff. H. K. Rouse, Project Supervisor for the Colorado Springs studies, has spent most of his time on the compilation and analysis of data collected during the past six years by the Colorado Springs and Vega, Texas, projects, and of similar data collected at other points, notably, Hays, Kansas, and Crow Creek, Wyoming. Reasonable progress is being made.

In connection with a Regional Orientation School, J. H. Dorroh, Jr., Project Supervisor for the Albuquerque, Santa Fe, and Safford studies, was requested to discuss the Hydrology of Region 6 with the students attending. On March 13 two hours were devoted to lecture and discussion, and it is felt that even in such a short time the men gained a greater insight into the characteristics of precipitation and runoff within the Region. Some time was also devoted to the characteristic evaporation.

Precipitation during March was very erratic at the ten watersheds near Safford, Santa Fe, and Albuquerque, ranging from only 60 percent of the normal at one of the watersheds at Safford to 134 percent at the Albuquerque areas. Mr. Dorroh was absent on sick leave for nearly two weeks of the month and was unable to make material progress on the tabulation of 1943 data. Some final checking of the Albuquerque data was completed, however, and a start was made on the tabulation of 1943 data taken from watersheds near Safford, Ariz.

Hydraulic Studies

Hydraulic Studies at the St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minn. - The design chart for the SAF stilling basin was redrawn during the month and a copy of the revised design chart was sent to Professor H. B. Roe of the University of Minnesota for inclusion in the book which he is now writing. The report entitled "The Hydraulic Design of Rectangular Spillways" prepared by Albert N. Huff was completed during the month by the Regional Section of Information, and it is now ready for distribution. Copies of this report can be supplied upon request to the Washington office. On March 28 the results obtained at the St. Anthony Falls Hydraulic Laboratory were presented before an engineering conference of zone technicians and district engineers in Milwaukee.

Hydraulic Studies at Logan, Utah - Permeability measurements were continued. Construction of a canal model was virtually completed and a preliminary test run made. O. W. Israelsen and C. W. Lauritzen participated in some discussions directed toward the preparation of an inventory of Utah Irrigation Facilities.

Hydraulic Studies at Corvallis, Oregon - Total exchangeable bases, exchangeable calcium and magnesium and water soluble sodium were determined in the Malheur County profiles. Profiles from hard-to-irrigate places showed 13 to 36 percent of the exchange complex occupied by sodium. Profiles from easy-to-irrigate places showed 5 to 8 percent of the exchange complex occupied by sodium. While A. W. Marsh was on a trip to Ontario, plans were completed for this year's irrigation studies and the plots were prepared for seeding.

Hydraulic Studies at Prosser, Washington - Very little analysis of data was done this month as most of the time was spent in the field. The 36 plots for 1944 work under the new work plans were laid out, manured, and plowed. The 18 plots which are to be in the 7-year rotation were seeded to wheat and alfalfa. The corn plots are ready for seeding which should take place about the first of May. Construction and installation of measuring boxes and flumes is going on as rapidly as possible.

Hydraulic Studies at the California Institute of Technology, Pasadena, Calif. - Plans, maps, and photographs were received from the Ft. Worth office of the Rita Blanca and Tierra Blanca Spillways. The proposal is to make model studies of these structures to study the inlet conditions at these spillways. The spillways are located in shallow water at the ends of the dams so that the inlet flow approaches over them at rather large angles, thus necessitating a changing in direction of the flow in order to get it directed from the spillway. As has been found in practice and in laboratory experiments, conditions of this kind may give rise to extremely serious disturbances in spillways that may overtop walls and cause damage or even failure.

The paper entitled "A Baffle Type Energy Dissipator for Pipe Outlets" was approved for publication. Additional laboratory tests were made on the pipe flow meter which was developed last fall for use in the local alfalfa fields. These experiments were to check the calibration of the meter under conditions of known asymmetrical flow through the meter. The objective of the tests is to determine the reliability of the device when operating under bad flow conditions which are known to exist in the field. When this short series of tests is completed, the plan is to prepare a report on the meter for publication.

Sedimentation Studies

Work is continuing on two regional analyses of available sediment production records. One paper, nearing completion, includes 80 sediment production records from areas ranging from a few square miles to more than 100,000 square miles in the Great Basin, Colorado, Gila, Rio Grande, and Pecos River drainage basins. An analysis is also being made of sediment production records from the Ohio River drainage basin.

Sediment Studies at the California Institute of Technology, Pasadena, California - A manuscript by Vito A. Vanoni, entitled "Transportation of Suspended Sediment by Water," was returned by the Editor of the Proceedings of the American Society of Civil Engineers for revision and checking before it is published.

Modification of the piping of the 10 1/2-inch flume to adapt it to experiments with heavy sediment loads was completed and the apparatus is now ready for calibration.

Two members of the project staff spent a day in the Simi Valley Soil Conservation District observing the results of the February flood. Considerable time was spent in the Simi Wash where much bank erosion damage occurred, resulting in the destruction of some valuable bottom land. A number of structures and tributary washes were also inspected. The trip was made with the Zone Specialist and the local engineers, and the hydraulic and sedimentation problems involved in the work were discussed at some length with these men.

A Bathythermograph and special winch was received from the Woods Hole Oceanographic Institution. This apparatus will be used in the density current studies to be made in Shaver Lake during May and June. It gives a record of temperature as a function of depth and will be very useful in this work. A reversing thermometer was also purchased and will be used in these studies.

A field trip made during the month furnished an opportunity to observe scour and erosion at some control structures.

Drainage Studies

Everglades Experiment Station at Belle Glade, Fla. - The 160 acres in Section 10 at the Experiment Station was conditioned for use during the month of February and the first part of March. Dr. Neller advises that nothing further should be done on this quarter section until the first of May, when the mole drains will be installed. It was thought best to allow the plowed area to settle during the months of March and April before constructing the mole drains. Soon after the mole drains have been installed, the necessary ditches will be excavated. A dragline is available for this work as soon as needed.

The two field survey parties completed approximately 100 square miles during the month of March. About 240 square miles remain yet to be surveyed before the soil survey of the Everglades Drainage District will be completed.

Drainage Investigations at St. Paul, Minnesota - One thing developed in connection with the completion of the report on "Durability of Drain Tile in Peat Soils" by Messrs. Miller and Snyder that has necessitated their doing a little extra work. This is the matter of converting the breaking strengths of concrete drain tile to compressive strengths in pounds per square inch. It is necessary that some information along this line be obtained in order that the test data may be properly interpreted. In other words, what breaking strengths should tile of certain diameters and wall thickness have in order to be as resistant to the action of peat as concrete in experimental cylinders of known compressive strengths. The modulus of rupture can be calculated for a tile, from the breaking strengths, but this involves the mathematics of hollow circular beams and the results are misleading as they are much higher than it is felt they should be for the type of concrete used in the smaller pipe. During the month some cylinders were made from aggregate used at one of the concrete tile plants and it is hoped that the test results will furnish the general information needed. The tamping of the cylinders was varied in order to obtain concrete with different degrees of absorption with the thought that compressive strengths of the cylinders with absorptions close to that of drain tile will give the tie-in needed.

The Everglades Project at Ft. Lauderdale, Fla. - The Cartographic Division in Washington is now preparing a tracing from the grid which was delivered to them during the recent visit of Albert Stephens, Project Engineer, to Washington. A review of the field data for the Project on Subsurface Hydrologic Investigations is made periodically. The log of the wells has been properly recorded and will be included in the manuscript prepared by Mr. Stephens for publication in the Soil Science Society Bulletin which is now about ready to go to press. Many of the farmers in the area are considering the drilling of wells for an assured water supply, and the data collected under this project have been of much use in advising property owners of what was found in adjacent wells.

In connection with the Project on Control of Waterstages in Outlet Drainage Canals, most of the month of March was used in assisting the engineer for the Everglades Drainage District in preparing a report of the existing water-control facilities in the district and suggestions for control of the water stages in the outlet drainage canals. A meeting was held on March 30 of the Everglades Advisory Committee, and this report was adopted with a certain amount of changes. Mr. Clayton of Belle Glade and Mr. Stephens worked with Mr. Wallis during the week of March 20 in the preparation of this report. Mimeographed copies will be made of the report as approved by the Committee, and these copies will be distributed to property owners in the district. After suggestions and criticisms have been recorded from the property owners and all those affected by the recommendation made in this report, the Everglades Drainage District Commissioners will take such action as deemed necessary and advisable.

It has now been definitely decided to locate the second 10-acre experimental plot on Section 9 to carry out the objective of the Project on Relation of Soil Type and Depth and Underlying Material to Pumping requirements. These 10 acres will be diked some time during the month of April.

The water table at the four gages was recorded during the month of March. Two additional gages are now being installed. One of the gages is being located on the Palm Beach-Broward County line east of the North New River Canal. The second gage is being installed east of the North New River Canal at about the same location as Dike B.

IRRIGATION DIVISION

Snow Surveys and Water Supply Forecasts

Western Montana, western Wyoming, northern Nevada, Idaho, and Washington - The March 1 snow survey and water supply forecast report was compiled, mimeographed and distributed. Some data for the April 1 report were obtained. The information at hand indicated the same general pattern of water year which was pointed out in the February 1 and March 1 reports. This year will be one of record low runoff in Columbia Basin, with variable degrees of water shortage, depending on the amount of storage facilities available.

Colorado, eastern Wyoming, Arizona, New Mexico, South Dakota - Records of stream flow and water content of snow cover on various drainages in Colorado and Wyoming were compiled and analyzed. Two diagrams were prepared, one illustrating a method of forecasting the runoff in the Cache la Poudre River as measured at the mouth of the canyon where this relation is based on water content and a correction factor related to the fall flow. The other diagram is for the Colorado River as measured at Glenwood Springs where the fall flow multiplied by the April 1 water content of the Tennessee Pass snow course is plotted against the summer flow and a correction factor based on the water content of this same snow course. For both these drainages the forecast runoff as compared with the actual flow showed a small percentage of deviation with the exception of one out of 8 years. Similar diagrams have been developed for other streams which generally show that close agreement can be expected in about this same ratio. It is now in mind to use similar diagrams in forecasting the runoff of several drainages for the coming season 1944 as based on the April 1 snow survey data and fall flow.

Oregon - The principal snow surveys of the year were under way on 100 snow course. Reports of water stored in reservoirs were coming in. Not sufficient data were at hand to warrant a statement as to the final water supply outlook for 1944.

Imperial Valley Drainage Investigations - (Calif.)

One suitable site for field determination of soil permeability was located. It has a fairly light-textured soil underlain at about 6 feet by a layer of tight clay. A soil investigation has been made, a shallow well put down and a set of piezometers installed. It is intended that as soon as irrigation brings the water table up to a higher level, the experiment will be started. Additional permeameters have been built and installed, increasing the capacity of the laboratory from 8 to 16 permeability samples.

A "pilot" project has been begun, in which soil samples are taken from 3 sites about 25 feet apart, by one-foot increments (except the first foot - 0-6" and 6-12") to 7 feet; and determination is made of moisture content and total salts. Sampling is repeated at intervals of about 10 days to obtain a detailed record of what happens through each irrigation cycle.

Pumping for Irrigation

Designs of different types of well-drilling rigs were assembled for use in Puerto Rico where construction of the rigs by local shops is planned.

A Chinese engineer, Mr. Lin Jen Pu, who is study in the United States, called at Ft. Odells, to get information on irrigation pumping and well drilling methods. Mr. Pu hopes to be able to establish irrigation pumping plants in the interior of China after the war.

Seepage Investigations

California - Recomputation of the data from observations on seepage losses from concrete lined canals on the Brentwood and Turlock projects in California disclosed that leaks through headgates and other structures, although small, may appreciably affect the apparent loss due to seepage. This is particularly true when the seepage loss is very small.

Colorado - Seepage from unlined canals in sandy soil, as shown by recent measurements on a lateral in the Gilcrest area in Colorado, may amount to 12 cubic feet per square foot of canal surface per day after conditions have become stabilized and may be as high as 25 cubic feet when water is first turned into the canal. These losses are from 100 to 500 times as great as those from canals with the best concrete linings. Lining such a lateral would save as much as 50 percent of the water.

Canal Lining Studies (Utah)

Progress was made on the special laboratory flume for measuring seepage losses through various bentonite and soil mixtures. It was expected that several experimental runs would be made with this flume during April.

Water-Application Efficiency Studies

Utah Agricultural Experiment Station Bulletin 311, "Water-Application Efficiencies in Irrigation," was issued and copies sent to all farm co-operators in Utah and Salt Lake Counties, to Utah water commissioners, and others. The data presented in this bulletin were developed in a cooperative study between the Experiment Station and the Division of Irrigation.

Customs, Regulations and Laws Relating to Irrigation

Central Valley Project, Calif. - The draft of a proposed report on Study 6, Problem 16, was completed and sent to the other members of the study group for consideration. This study deals with relationships between costs and values of irrigation services. Some attention was given to suggested revisions of the tentative report of Committee 12, on indirect benefits.

Gabbert Canyon, Ventura County, Calif. - A tentative report on the appraisal of benefits expected to accrue to certain lands tributary to Gabbert Canyon in Ventura County, from contemplated erosion controls, was completed. A similar report on the Runkle Canyon survey was started.

Flow of Water in Canals and Pipes

During the month of March, the leader reviewed the reports of the Pecos River Joint Investigation, getting preliminary data wherewith to aid the Texas region in the improvement of the irrigation systems on the Pecos River below Red Bluff Reservoir. The proposal is to replace the many diversions from the stream, each one lower on the river than its associates, and thus receiving much of the salty return waters from upper systems. The replacement will comprise a smaller number of "grand" canals diverting better water and delivering that water to each of the "districts" as that district is reached. There should result a general saving in the water available, as the proposed canals would be much straighter than the very sinuous Pecos River, in which there is an excessive water loss due to the large amount of surface exposed to evaporation, and to the dense growth of salt cedars that line the river banks.

Silt in Streams and Reservoirs (Texas)

Two samples of silt soil were obtained from Lake Diller near Albany, Texas, for the purpose of making soil analyses. The reservoir was almost dry and the water was not used at the time the samples were taken.

Evaporation Studies, Texas and New Mexico

A new evaporation station at Lake Avalon near Carlsbad, New Mexico, was contemplated during the month in cooperation with the Carlsbad Project of the U. S. Bureau of Reclamation. Equipment formerly used at the evapotranspiration station near Carlsbad, which was discontinued on March 29, after having been in operation since 1939, will probably be used in connection with the new station.

Irrigation and Drainage Investigations (Texas)

Irrigation - Water measurement data for 1943 were obtained for 63 farms located in Pecos County Water Improvement District No. 1, Ft. Stockton, Texas. Yield data for cotton grown on these farms were obtained from the AAA for 1942 and 1943. This information as well as some obtained at Balmorhea and other areas in West Texas will be used in connection with a report being prepared on irrigation and use of water by crops in West Texas.

Drainage - Several days were spent by our Texas field representative in assisting and advising officials of Grandfalls Drainage District of Ward County concerning their drainage problems. The District installed drains many years ago but due to lack of maintenance, they have become clogged and salt cedars have grown in them so that at the present time they are not functioning and are inefficient. Our representative also supervised the installation of a number of observation wells, the data from which will be helpful in designing and locating additional drains. Soil logs of wet soil were recorded and samples of clays and gypsum sands were obtained for soil tests at the Austin laboratory. The movement of water in these soils appeared to be slow. Most of the present drains were constructed in these soils. From 10 to 12 feet and more beneath these soils, the soil texture is coarser and a better rate of underground movement is expected. The District plans to deepen the present drains, lower culverts and other structures under roads and highways, and construct additional drains where necessary for efficient drainage.

Kootenai Investigation (Idaho)

The annual progress report for 1943 was practically completed. Bi-monthly reports received from the resident employee at Bonners Ferry indicated that the ground was frozen to a depth of about a foot and all farming operations were at a standstill. The winter was mild, and the early spring season very dry.

Evaporation from Water Surfaces (Southern California)

The evaporation station at Lake Elsinore has been discontinued after 5-1/2 years of observation, and the equipment removed. Stations at San Jacinto and at Beaumont are being continued with all observations made by cooperating agencies without cost to the Division of Irrigation. Records are sent to Pomona, but because of lack of office assistance, calculations are not kept up to date.

Utilization and Conservation of Water (Southern California)

San Luis Rey Valley (San Diego County). - The project leader attended a conference at which various phases of the results of field studies for several years were discussed with representatives of the Carlsbad Mutual Water Co. At a later conference with the same group, representatives of the State of California Division of Water Resources were present. There is some anxiety felt by the local water users as to the adequacy of the supply in event of any great future development or a period of dry years. A map prepared by the Division of Irrigation, showing irrigated land in the San Luis Rey Valley was presented and methods of determining the irrigable acreage within reasonable pumping lifts were discussed. Arrangements were completed to have local agencies continue making measurements of depth to water table in observation wells every three months, beginning April 3.

Santa Ana Canyon Water Supply Study (Orange County) - Much of the existing well data has been examined and partially analyzed so as to determine what additional field data must be obtained. Installation of an evapo-transpiration station was completed during the month and records were scheduled to start April 1. Meteorological equipment was installed and put in operation at the Prado Dam evaporation station. Arrangements were completed for putting down approximately 16 observation wells in areas where no records exist. Some of these wells will be used in determining the rate of underflow when pumping for irrigation is at a maximum.

Pecos River (New Mexico) - A start was made on compiling monthly evaporation, temperature and humidity records of the Weather Bureau evaporation stations in Pecos River Basin for the years 1942 and 1943. Regular weekly records of observations of evapo-transpiration, evaporation, precipitation, temperature, humidity and wind movement for the month of March 1944 were received for the cooperative station of the Division of Irrigation at Carlsbad, New Mexico.

Replenishment of Ground-Water Supplies by Water Spreading

Preliminary steps were taken in the formulation of a cooperative agreement between the U. S. Salinity Laboratory at Riverside, Calif., the State of California, Kern County Water Storage District, Edison-Arvin Water Storage District, Bureau of Reclamation, and the Division of Irrigation, Soil Conservation Service. Although no formal agreement had as yet been signed, the cooperation seemed assured and some field work had been started by certain of the agencies. This work consisted of the construction of experimental percolation ponds, which can not be delayed further owing to the lateness of the season, if full benefit is to be obtained. Two conferences were held during the month for the purpose of discussing an agreement and a program outline.

The Division of Irrigation has also maintained a water-stage recorder at the diversion works of the Santa Ana River spreading grounds in San Bernardino County. Water diverted there is limited both in rate and seasonal quantity by Court Stipulation, and the Division is responsible for the water measurement.

4/25/44